Acute Illness Associated With Sulfuryl Fluoride Exposure – United States, 2000-2015

Research Excellence Initiative
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Background

• A family became sick after house fumigation on August 19, 2015.
• Fumigation was conducted with sulfuryl fluoride (SF) and chloropicrin.
• Son, daughter, mother, and grandmother went to emergency department.
• 9-year-old son reported serious illness.
Structural Fumigation

- Pest control method that involves filling the airspace within the structure with a toxic gas.
- A tarp or tent is used over the structure to trap the gas inside.
- The gas penetrates cracks, crevices, and pores in the wood to eliminate pests.
- SF is the most commonly used fumigant in structural fumigations.
Structural Fumigation (Tenting)

Source: https://en.wikipedia.org/wiki/Fumigation
Fumigation Process

- **Treatment period**: fumigant is introduced and held under a tarp for a specified period of time.
- **Aeration**: process of evacuating all of the fumigant from the tarped structure.
- **Official clearance**: when it is safe for humans to reenter the fumigated area without the use of respiratory protection.
Pesticide Poisoning Surveillance and Investigation

- Pesticide-related illness and injury is a reportable condition in Florida.
- Reports are investigated by county health departments.
- Agencies involved in the investigation are the Florida Department of Agriculture and Consumer Services, the Florida Poison Information Center Network, and the Florida Department of Health.
Investigation Findings

- 9-year-old son was hospitalized for 19 days and placed in a rehabilitation center for an additional 20 days for basal ganglia injury.
- Grandmother, mother, and daughter were released home on that same day with a diagnosis of chemical inhalation.
- Father did not seek medical treatment.
Violations of Pesticide Use

- Revoked license of the business and pest control operator who conducted fumigation.
- Violations identified
  - Failure to have functioning devices to measure SF concentrations.
  - Failure of the operator to participate in the manufacturer’s training and stewardship plan.
Determination of Poisoning

- SF exposure was the most likely cause of illness among all five family members.
- Father was classified as probable case, and other four were classified as confirmed cases of SF-related illness.
- The son had high severity of illness and others had low severity of illness.
Notes from the Field

Acute Sulfuryl Fluoride Poisoning in a Family — Florida, August 2015
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On August 19, 2015, the Florida Department of Health (FDOH) was notified by the Florida Poison Information Center Network and a local hospital of possible sulfuryl fluoride poisonings affecting a family in Martin County, in southeastern Florida. Sulfuryl fluoride is a highly toxic (toxicity category I) gas fumigant used for termite control of homes and buildings. FDOH personnel in Martin County commenced an investigation and identified a family of five (a grandmother, mother, father, son, and daughter) exposed to sulfuryl fluoride after their house was fumigated. The Florida Department of Agriculture and Consumer Services (FDACS) and U.S. Environmental Protection Agency (EPA) obtained a urinary toxicology profile was negative. He was admitted to the pediatric intensive care unit and was intubated for the first 2 days of hospitalization for airway protection from aspiration. Computerized tomography scan of the brain showed no cerebral edema or evidence of bleeding. On August 18, he developed choreoathetosis that progressed to involve both arms, legs, and both sides of his face; a brain magnetic resonance imaging study was consistent with basal ganglia injury. He underwent two rounds of hemodialysis to assist with fluoride ion removal, although documentation of his serum fluoride concentration was not found in the medical record. After excluding carbon monoxide and heavy metal poisoning, anoxic brain injury, and metabolic disorders, the treating physicians attributed his neurologic findings to sulfuryl fluoride poisoning, manifested by basal ganglia necrosis. Because there is no specific antidote for

Source: www.cdc.gov/mmwr/volumes/65/wr/mm6527a4.htm
Objective

- Article to assess the burden of SF poisoning in U.S.
- Analysis will include cases from the Sentinel Event Notification System for Occupational Risk (SENSOR)-pesticide program, National Poison Data System (NPDS), the California Department of Pesticide Regulation (CDPR) Pesticide Illness Surveillance Program (PISP), and the Incident Data System (IDS)
NOTIFICATION OF DEPARTMENT OF HEALTH DETERMINATION OF EXEMPTION

August 26, 2016

To: Prakash Mulay
Protocol Title: Acute illness associated with sulfuryl fluoride exposure – United States, 2000-2015
Review Type: Staff Review

Approval Date: August 26, 2016

The Ethics and Human Research Protection Program determined your study qualifies for one or more exemptions from federal regulations governing research involving human participants.

If there is a change in the activity, it may no longer qualify for exemption. Please contact the Ethics and Human Research Protection Program to determine if changes in your project require IRB review.
Data Sources

• 2000 to 2013:
  • Sentinel Event Notification System for Occupational Risks (SENSOR) - Pesticides
  • California Department of Pesticide Regulation (CDPR)

• 2000 to 2015:
  • National Poison Data System (NPDS)
  • U.S. Environmental Protection Agency (EPA), Incident Data System (IDS)
Data Analysis

- Matched cases from SENSOR-Pesticides, CDPR, NPDS, and IDS data
- Excluded duplicate cases, cases with exposure to more than two substances, and cases with less than two signs/symptoms
- Descriptive statistics using SAS software 9.4
Preliminary Results
SF-Related Illness By Data Source, 2000–2015 (n=888)
SF-Related Illness By Exposure Year, 2000–2015 (n=888)
SF-Related Illness By Exposure Month, 2000–2015 (n=888)
SF-Related Illness By Age Group, 2000–2015 (n=888)
Age (Years)

- Mean – 40
- Mode – 30
- Median – 40
- Range – 0.5 to 89
SF-Related Illness By Gender, 2000–2015 (n=888)

Number of Cases

- Female: 530
- Male: 340
- Unknown: 18

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To protect, promote and improve the health of all people in Florida through integrated state, county, and community efforts.
SF-Related Illness By Relation to Work, 2000–2015 (n=888)

Number of Cases

- Not Work-Related
- Work-Related
- Unknown

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SF-Related Illness By Severity of Illness, 2000–2015 (n=888)

Number of Cases

- Low: 700 cases
- Moderate: 100 cases
- High: 10 cases
- Fatal: 10 cases

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SF-Related Illness By State, 2000–2015 (n=888)

- California: 638
- Florida: 205
- Hawaii: 34
- Other: 13

Number of Cases
SF-Related Illness By Exposure Site, 2000–2015 (n=888)

Number of Cases

- Own or Other Residence: 700 cases
- Workplace
- Office/ Business
- Other
- Unknown
- School
- Public Area
- Prison
SF-Related Illness By Type of Exposure, 2000–2015 (n=226*)

*NPDS data did not report type of exposure.
SF-Related Illness By Signs/ Symptoms*, 2000–2015 (n=888)

* All individuals reported 2 or more signs and symptoms.

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SF-Related Illness By Root Cause, 2000–2015 (n=888)

- Unknown
- Inadequate ventilation of treated area
- No label violation identified
- Early re-entry
- Drift
- Other
- Label violations NOS

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Revised Certification Standards for Pesticide Applicators

EPA has finalized stronger standards for people who apply restricted use pesticides (RUPs). These revisions to the Certification of Pesticide Applicators rule will reduce the likelihood of harm from the misapplication of toxic pesticides. Pesticide use will be safer with increased supervision and oversight. These revisions will help ensure that RUPs are used safely.

EPA is making a pre-publication (unofficial) version of the final rule available until the official version is published in the Federal Register.

On this page:

Related Information:
- See the Press Release
- Fact sheet on the Certification of Pesticide Applicators rule revision
- Current Certification of Pesticide Applicators rule vs. Revised rule
- Learn more about certification of pesticide

Source: www.epa.gov/pesticide-worker-safety/revised-certification-standards-pesticide-applicators
EPA Report

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF INSPECTOR GENERAL

Chemical Safety

Additional Measures Can Be Taken to Prevent Deaths and Serious Injuries From Residential Fumigations

Report No. 17-P-0053
December 12, 2016

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Future Direction/Discussion

• Data analysis
• Prepare a manuscript
• Review and approval
• Submission to journal
• Comments and response
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